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# Facts about
# Tuberculosis Eradication
# in Cattle and Other Animals

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Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

## TO AGRICULTURAL LEADERS:

For more than four decades, the U. S. Department of Agriculture, the States and the livestock industry have cooperated in an effort to eradicate tuberculosis from the livestock population of the United States. Even so, the disease is still with us--still a threat to the agricultural economy of the United States and to the health of its people and livestock.

Great progress has been made in reducing the incidence of tuberculosis during this period. But, as with most cooperative disease-eradication efforts, the nearer the eradication goal is approached the more difficult progress becomes. To accomplish the goal of eradication, we must find and destroy the last source of infection, no matter how much the disease symptoms may be masked; how remote or obscure the source may be.

An informed public that understands the eradication objective and obstacles to be overcome is an asset to the prosecution of any disease-eradication effort at any stage of progress. Such an informed public becomes an essential part of progress when the percent of infection has been reduced to a low level, as it has in the program against bovine tuberculosis.

This report reflects the continuing effort of the Agricultural Research Service of the U. S. Department of Agriculture to gain an informed public. It has been written to specifically inform you, who are America's agricultural leaders, on the current status of bovine-tuberculosis eradication.

Information in this report was provided by the Animal Disease Eradication Division, Agricultural Research Service

# FACTS ABOUT TUBERCULOSIS ERADICATION IN CATTLE AND OTHER ANIMALS

The drive to eradicate bovine tuberculosis was started in 1917, when nearly 3-1/2 million cattle (about 5 percent of the total cattle population) were infected. Good progress has been made. By 1940 every State had earned the modified-accredited status--that is, bovine tuberculosis among the cattle had been reduced to less than 0.5 percent.

In 1960, the 43rd year of the program, 15 cattle out of every 10,000 in the United States had the disease. The rate of incidence of the disease, 0.15 percent, was slightly lower than in 1950. But during this last decade, the disease rate remained steady for three years and then increased slightly for 5 years.

Some of the problems that have caused this slowdown in progress toward eradication are being solved. More effective methods of tuberculosis eradication are being pressed into use. Quarantine regulations are being strengthened and given renewed emphasis. Training programs have been developed in many States, for the benefit of veterinarians, to further increase the efficiency and uniformity of diagnostic procedures. And veterinary colleges are giving more emphasis and devoting more time to the study of this disease.

## MAJOR ASPECTS OF THE PROBLEM

The principal factors in tuberculosis eradication include: The contagious nature of the disease, the increasing traffic in cattle, the diagnosis of tuberculosis in animals at time of slaughter, and the identification and tracing of infected cattle to herds of origin.

Contagious character of the disease.--Symptoms of tuberculosis vary, depending on the type and virulence of the organism, the resistance of the affected animal, and the part of the body in which the organism becomes localized. There are three types of tubercle bacilli--bovine, human, and avian. Each type is most contagious and most pathogenic within its specialized host species. Cattle are the chief hosts and chief disseminators of the bovine tubercle bacillus, but are infected by the avian and human types of the organism. Swine may be infected by all three types of bacilli, especially the avian and bovine types.

It is remarkable that cattle appearing to be in prime condition may be severely infected and spreading the disease. In cattle infected with bovine tuberculosis, lesions are often found in the lymph glands near the lungs and bronchae. Tubercles (nodules) may be formed. Under favorable conditions, these walled-off pockets of tubercle bacilli break down, expelling virulent organisms into a bronchus. They then pass into the trachea, from whence they may be expelled by coughing or may be swallowed.

Another animal may inhale the bacilli directly into the lungs and become infected. But probably more often, the bacilli are picked up with the food or drinking water. When swallowed, the tubercle bacilli may pass unchanged through the intestine. Manure and saliva containing the organism may contaminate the hay at hayracks, may contaminate small streams, and in stagnant pools may shelter the viable organisms for a year or more. Hogs following infected cattle in the feedlot and feeding on undigested grain in the droppings are particularly likely to become infected with the disease. A calf may be infected in a single nursing if its mother has tuberculosis of the udder. All of these are potentials of great importance when a tuberculosis outbreak is to be stamped out.

Greater movement of cattle.--The risk of spreading tuberculosis into previously disease-free herds and localities has increased with the greater movement of cattle in the last several years. Roads have been improving, and trucking is on the increase. More cattle are being shipped, and over greater distances today than in the past. And buying and selling of cattle through markets and sales rings are on the increase. Also, cattle sent to market for slaughter may be diverted to milk production, breeding, or feeding.

To illustrate the point, an owner sold 88 Angus cattle with the expectation that they were going for immediate slaughter. However, they were diverted to a market where they were dispersed. Of the 48 that went to slaughterhouses, the carcasses of 5 revealed tuberculosis lesions. The other 40, bought for various purposes other than slaughter, were traced and tested, and 23 of them found on 7 premises responded to the tuberculosis test.

Improved identification.--Better identification of market cattle in the last few years, especially through the use of backtags and eartags, has made it possible to trace more of the tuberculous animals discovered at regular slaughter back to the herds from which they came. Testing those herds of origin and associated herds offers about eight times the chance of finding infected animals as does routine testing of cattle at large. Of course, the increase in the tuberculosis-incidence figures was to some extent due to these improved case-finding methods.

Detection at slaughter.--Discovery of infected animals at regular slaughter depends on advanced development of the disease lesions. Only when the disease has advanced so that lesions are visible to the naked eye will the disease be found on routine slaughter. An effective serological test, if developed for tuberculosis similar to the blood test for brucellosis, would be helpful in speeding up eradication. Scientists have worked on this problem for many years and are continuing the effort.

## CURRENT STATUS OF THE DISEASE

Tuberculosis still exists to some extent in every State, menacing the livestock industry and threatening to undo the tremendous progress already made toward eradication. Eradication therefore is the problem of every area and State. The disease is most prevalent in the top dairy States.

This is because dairy cattle are kept in relatively confined areas and because many dairymen have other classes of livestock, which may harbor various types of tuberculosis and transmit the disease to cattle. Cattle may be infected with any of these types of tuberculosis and, if so, may react to the tuberculin test.

Because the tuberculosis infection rates in the dairy States are relatively higher than in range areas, more assistance in eradication of the disease is being given to these areas. This is advantageous not only to the industry and the public, but also to other areas that buy cattle from them. It follows that strengthening the national confidence in the healthfulness of such cattle will improve the dairy regions' returns from their sale cattle.

## BASIC ESSENTIALS FOR ERADICATING TUBERCULOSIS

Many actions and attitudes go into a successful disease-eradication program. It is essential, however, that these things be done:

1. Test accredited areas for reaccreditation in confomity with the uniform methods and rules recommended by the U. S. Livestock Sanitary Association and approved by the U. S. Department of Agriculture.

2. Effectively quarantine any herd which is found to harbor tuberculosis. Livestock sanitary officials find it is necessary to keep such herds under quarantine until there is no further liklihood of recurrence of the disease.

3. Locate and remove all sources of infection, such as tuberculous hogs, sheep, and chickens, and unsanitary conditions such as manure accumulations and poorly drained quarters. Clean up the premises to prevent the spread of disease if an outbreak of tuberculosis occurs.

4. Trace the origin of every tuberculous animal, whether found through routine tests or inspection at slaughter, and test all animals that may have been exposed.

For effective operation of the program, the following are important tools with which agricultural leaders should be familiar: The tuberculin test, the quarantine, post-mortem examination, and backtagging and eartagging.

Tuberculin test.--The most important tool or technique is the tuberculin test. It is one of the best diagnostic tests available for disclosing an animal disease. The test is based on the fact that invading tubercle bacilli make the animal's body sensitive to the products of those bacteria. Tuberculin is a special preparation made for the express purpose of detecting animals affected with the disease. When tuberculin is injected into the skin (intradermally), a swelling occurs in tuberculous animals at the site of the injection, usually within 72 hours. The intradermal injection in the loose skin at the head of the tail (caudal fold) is approved and recommended at the usual site of the test for use in the tuberculosis-eradication program. The test must, however, be administered and observed by veterinarians who are trained to recognize and interpret the reaction.

Quarantine.--Herds in which reactors occur are quarantined. This is a most important provision, for herds that once harbored the disease cannot be considered free of the disease until there is assurance that no further sources of infection remain on the farm.

Post-mortem inspection.--Lesions of tuberculosis large enough to be visible are identified and reported by meat inspectors in packinghouses. They are most often found in lymph glands associated with the lungs, intestines, udder, throat, and neck, but may occur elsewhere. Gross lesions suggest advanced and highly infectious cases of tuberculosis. Those animals are only a fraction of the total number of tuberculous cattle, many of which have lesions too obscure to be seen by inspectors. The reports on lesion-bearing carcasses are, nevertheless, an important tool in discovering and cleaning up diseased herds. When the diseased animals are traced to the herds from which they came and all cattle in those herds are tuberculin-tested, about 1 animal in 64 proves to have tuberculosis, sometimes in an advanced stage. That is much higher than the ratio of reactors found through routine herd testing.

Backtag and eartag.--Unfortunately not all animals sent to slaughter bear identifications. The backtag and eartag are among the most widely used and effective means of identifying animals in the slaughterhouse and tracing diseased ones to their source herds for tuberculin testing. About a third of those herds tested as a result of traceback from lesions found during routine kill harbor the disease.

The backtag is a relatively new tool developed to give more widespread identification to market cattle. It shows in code the State, County, and herd to which the animal belonged. It was developed in the brucellosis-eradication campaign, but is useful in other programs. It is extensively used in many areas, particularly the Western range areas.

Eartags have long been used to identify animals of breed associations and of the Dairy Herd Improvement Association. Eartags are also used in disease-eradication programs, especially the brucellosis and tuberculosis campaigns. Tag identities can be obtained from the organization that operates the tagging program and in some cases untagged cattle can be traced through the commission merchant who sold the animal for slaughter or from brand inspectors in the case of beef cattle.

Tracebacks from gross-lesion cases will be increasingly important as the last few centers of infection in the country are being sought out. Of 495 visible-lesion cases reported by Federal meat inspectors in a recent year, 33 were unidentified and untraceable--each one the lost key to potentially tuberculous herds.

Agricultural leaders can be of invaluable service by persuading farmers and ranchers, cattlemen's organizations, marketing groups, and packers of the great advantage to them in developing the universal use of appropriate identification tools.

## A PLAN OF ACTION

On the basis of this evaluation, the tuberculosis-eradication program for cattle is being realined and invigorated. This is what is being done and what is planned.

Federal-State level of administration.--A new deadline was recommended by the Committee on Tuberculosis of the U. S. Livestock Sanitary Association for area testing of cattle. Counties and States are uniformly required to keep up to date in their cattle testing in order to maintain modified-accredited status.

Cattlemen, cattle associations, dealers, commission men, packers, and others are being urged to cooperate in the use of the uniform eartag fostered by Federal-State herd-improvement and disease-eradication officials and the backtag developed under disease-eradication programs for identifying market cattle. Federal-State tuberculosis-eradication officials will take the lead in tracing diseased animals observed at slaughter back to the herds of origin so sources of infection can be identified and eliminated. The Livestock Sanitary officials will supervise the tuberculin testing of such herds, the disposition of animals found to be diseased, and the cleanup and disinfection of premises.

Cooperative conferences and workshops have been held in several localities to acquaint veterinarians and other key persons with the tuberculosis problem. Testing and interpretation of test results, laboratory procedures, and sound cleanup procedures were emphasized. Workshops of this kind will be held elsewhere as needed.

Increased research and investigational work are being done at ARS laboratories and elsewhere on test methods, post-mortem examinations, and various technical aspects of tuberculosis eradication. Field studies designed to test and evaluate new techniques and diagnostic agents are being conducted in several States.

USDA does, of course, provide a share of the funds and personnel to assist the States in the testing program and for payment of indemnities on cattle condemned and slaughtered under the eradication program.

State and Local Levels of Administration.--A large share of the responsibility for the program rests on State and local livestock sanitary officials, and they can do much to assure the eradication of the disease. They, along with Federal officials, have the responsibility to carry on a thorough, systematic program of cattle testing, repeated at proper intervals, to enable counties and the State to maintain their modified accredited status leading toward eradication. They also are in the best position to encourage cattlemen to seek accreditation for their individual herds. But the responsibility of State and local officials goes beyond this. They are the ones who must take the lead and press on toward a goal of eradication, if progress is to be made.

Agricultural Extension specialists, county agents (and, in fact, all agricultural leaders) in addition to the State and local officials have a great opportunity to enlist cooperation of the State's cattle industry--cattlemen, cattle associations, marketing associations, dealers, livestock commission firms, auction-market operators, and veterinarians--in tracking down infected animals and herds, eradicating the disease, and safeguarding the public health and the economy of the livestock industry. Through public appearance and releases of information, these officials can make the whole population, including farmers, aware of the need, opportunity, and advantage of helping in the effort. Local officials, can also keep public agencies and the public at large informed of the financial needs for success of their program.

Participation on the Farm or Ranch.--Ultimately, the opportunity for tuberculosis eradication rests with farmers or ranchers. They can do many things to assure the success of the program.

They should cooperate with the regulatory officials and have all their cattle tuberculin-tested when asked to do so and when retests are due. Cattle owners should promptly dispose of reactors as required. If reactors are detected, the owners can help the veterinarian trace sources of infection by making available records of sales and movements and by following his recommendation for eradicating the disease from the premises.

Poultry and swine should be kept away from the cattle and the cattle barn. All poultry should be sold for slaughter at the end of the first laying season. Livestock should be kept from ponds and slow-moving streams. Animals should have access to a sanitary water supply uncontaminated by animal or human wastes. Finally, nonpasteurized creamery skim milk should not be fed to calves or other animals.

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